

# Vishnu Kadiyala

Autonomy / ML Research Engineer | Multi-Agent RL | Decision-Making under Uncertainty

Norman, OK | vishnupk@ou.edu | github.com/vishnukadiyala | linkedin.com/in/vishnu-kadiyala | Google Scholar

## Summary

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Ph.D. candidate building learning-based decision systems under uncertainty, with emphasis on multi-agent coordination, partial observability, and transformer-based representations. Delivered end-to-end ML pipelines on real sensor modalities (satellite, radar, vision) and HPC infrastructure. Seeking Autonomy / ML / Perception internship roles where learning dynamics, robustness, and systems thinking matter.

## Core Skills

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**Languages:** Python, MATLAB

**ML / RL:** Multi-Agent RL, Partial Observability, Decentralized Policies, Representation Learning, Transformers, CNNs, Diffusion Models

**Frameworks:** TensorFlow, Keras

**Data / Systems:** Pandas, Xarray, NetCDF, HPC/SLURM, Linux

**Strengths:** Debugging, Experiment Design, Training Stability Analysis, Sensor Fusion Reasoning

## Reinforcement Learning & Autonomy Expertise

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- Decentralized decision-making and coordination learning under partial observability
- Belief/representation modeling for policy learning without explicit communication
- Diagnosing learning behavior: reward shaping pitfalls, variance, instability, and generalization gaps
- Evaluation mindset: ablations, counterfactual tests, and robustness-focused benchmarking

## Experience

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**Graduate Researcher — NSF AI2ES (Environmental Sensing & Learning Systems)** Jan 2024 – July 2025

- Designed transformer-based architectures for learning latent representations from irregular, noisy, multi-source observations (spatio-temporal sensing).
- Achieved **13× improvement** over Marshall–Palmer rainfall baseline using a parameter-efficient neural approach (~2.5M parameters).
- Developed vision-based atmospheric visibility inference from distributed camera streams, extending coverage beyond sparsely deployed reference stations.
- Built scalable data pipelines and training workflows on HPC/SLURM; emphasized reproducibility, diagnostics, and failure-driven iteration.

**Graduate Researcher — NASA GeoCARB (Satellite ML & Anomaly Detection)** Jan 2021 – May 2023

- Developed U-Net model achieving **95% accuracy** for methane hotspot detection from satellite imagery; validated across diverse scenes.
- Built time-series anomaly detection improving performance from **80% to 90.2%** using diffusion-based generative modeling.
- Performed geospatial analysis to localize persistent emitters; prioritized robustness to distribution shift and noisy observations.

**Autonomous Driving & Multi-Agent RL Research (PhD)**

2025 – Present

- Investigating decentralized policy learning and implicit coordination for agents operating under partial observability and non-stationary interaction dynamics.
- Designing attention-driven latent belief updates enabling agents to infer teammate intent from observed actions (no explicit messaging).
- Focusing on evaluation that separates coordination from coincidence (ablations, policy shuffling/counterfactual tests, robustness checks).

## Selected Projects

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- **Latent Representation Learning for Irregular Sensors:** transformer-based spatio-temporal modeling for incomplete and irregular observations.
- **Document Structure Understanding:** neural pipeline for table/plot localization with **99% detection accuracy**; dataset construction and automation.
- **MARL Coordination (in progress):** belief-based coordination mechanism for cooperative settings under partial observability.

## Publications (Selected)

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- M. X. Sasser, M. Wilson Reyes, **V. P. Kadiyala**, et al. *Estimating Statewide Atmospheric Visibility From Camera Images*. AMS, 2025.
- E. Spicer, S. Crowell, F. Xu, **V. P. Kadiyala**, et al. *Carbon-Based Pollutant Source Influence during TRACER*. AMS, 2024.
- **V. P. Kadiyala**. *Localization of Tables and Plots in Documents Using Deep Neural Networks*. M.S. Thesis, 2022.

## Education

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Ph.D., Computer Science (Expected 2027) — University of Oklahoma

M.S., Electrical & Computer Engineering — University of Oklahoma

B.E., Electronics & Communication Engineering — KLE Technological University